PANEL DISCUSSIONS

Panel 1: Airborne Volcanic Ash: Perspectives, Challenges, and Opportunities

Moderator: Dr. Elbert (Joe) Friday, *WeatherNews Professor of Meteorology and Founding Director of the Sasaki Applied Meteorology Research Institute, University of Oklahoma*

Rapporteur: Mr. Floyd Hauth, *Science and Technology Corporation*

Panelists: Dr. Thomas P. Miller, *Scientist Emeritus, USGS Alaska Volcano Observatory*
Dr. Louis Uccellini, *Director, NOAA's NWS National Centers for Environmental Prediction*
Ms. Gloria Kulesa, *Manager, Aviation Weather Research Program, FAA*
Mr. Alan Shaffer, *Director, Plans and Programs, Office of the Secretary of Defense*
Mr. Peter Chen, *Environment Canada, Atmospheric and Climate Science Directorate*

Synopsis: This panel focused on the progress of key actions/recommendations from the first conference; the current state of volcanic ash operational support and the status of supporting research; resource coordination and leveraging across the spectrum of operations and research; the transition of research into applications; and opportunities for the future, including efficient leveraging of the national and international technologies and research. Highlights included noting the good progress on volcanic ash initiatives since the first symposium and that partnerships and collaboration in the area of detection and warning are healthy. It was also noted that gaps continue in our understanding of the ash hazard and that some deficiencies continue with observations (analyses), modeling, and warning delivery. It was also noted that volcanic ash can reach commercial flight levels in as little as 5 minutes which poses a real challenge for the volcanic ash warning system.

Dr. Thomas Miller: Dr. Miller summarized the composition of volcanic ash, the stringent requirement for timeliness of warnings, and information on the threat of encounters. He indicated that much progress had been made since the first symposium, but there is a need to continue efforts to improve the warnings.

Dr. Louis Uccellini: Dr. Uccellini noted that the 5-minute requirement was hard to achieve but provided a good challenge to improve observations, modeling (forecasts), and delivery processes. Progress continues in model improvements, but the analysis process still requires too much time and delays warnings.

Ms. Gloria Kulesa: Ms. Kulesa described FAA program investments in science and technology for aviation support. There are many partnerships in place, and collaborations continue to be healthy.

Mr. Peter Chen: Mr. Chen stated that volcanic ash warning requirements demand quick response and action for aviation safety. The providers of products and services need to continue to invest in modeling and supporting computation capability. There is also a need to determine the gaps in capabilities to deal with volcanic ash. He is also concerned about the possibility of higher false alarm rates when efforts push for achieving the 5-minute warning goal.

Mr. Alan Schaefer: Mr. Schaefer described DOD activities and capabilities that support aviation operations threatened by volcanic ash. He also reported on progress supporting research projects. He indicated that satellites have the best potential to meet observation/detection needs. Navy centers currently issue tailored ash forecasts.

Panel 2: Education, Training, and Outreach

Moderator: Dr. Gregory S. Forbes, *Severe Weather Expert, The Weather Channel*

Rapporteur: Mr. Donald Carver, *FAA*

Panelists: Ms. Cyndie Abelman, *Meteorologist-In-Charge, NOAA's NWS, Oklahoma City, OK*
Captain Albert Beerley, *US Airways Airbus, US Airways/ALPA Training Committee*
Mr. John O'Brien, *Director, Engineering and Air Safety Department, Air Line Pilots Association*
Mr. Saburo Onodera, *Manager, Flight Crew Training Department, Japan Airlines*
Professor Eric Doten, *Director of Center for Aerospace Safety/Security Education, Embry-Riddle Aeronautical University*

Synopsis: The diverse panel discussed the education, training, and outreach activities within the university structure, the FAA, the airlines, as well as the international community. While many training/education programs exist, the panel highlighted the need for more training on the coordination of military and civil airspace during volcanic ash hazards; for continued development of bibliographies for training materials and case studies; and the need for outreach to agencies on understanding the risk and the reasons to provide resources for volcanic ash mitigation.

Ms. Cyndie Abelman: Ms. Abelman stated that the FAA academy has intense weather training for flight service specialists. In the near future the training will include a volcanic ash hazards module. En route center controllers are assisted/advised by NWS personnel in Center Weather Service Units.

Captain Albert Beerley: Captain Beerley noted that U.S. Airways trains on specific risk areas relative to their routes and terminals of operation. Training includes approach/departure procedures and sources of advisory/warning services.

Mr. John O'Brien: Mr. O'Brien noted that the Air Line Pilots Association promotes operational awareness and procedures to enhance safety among its global membership. Members support programs plus outreach to agencies, controlling resources for research and development for better services.

Mr. Saburo Onodera: Mr. Onodera stated that Japan Airlines has established a syllabus for training for each level of crew competencies, including volcanic ash avoidance and limits to operations. They emphasize route selection alternatives and simulations/drills.

Professer Eric Doten: Dr. Doten stated that Embry-Riddle Aeronautical University has 130 centers where they confer degrees in applied science for meteorology, including research opportunities.